



## **NSTA Guide for Leading a Study Group on Next Generation Science Standards, First Public Draft**

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In a process managed by Achieve, Inc., a non-profit education reform organization, 26 states are currently leading the development of Next Generation Science Standards (NGSS). The standards will undergo multiple reviews, including two public drafts. The first public draft is expected this spring, when the science education community will have the opportunity to review the document and provide input to Achieve and its writers. A second public review will take place later this year, with a final document expected in late 2012 or early 2013. NSTA encourages science educators to actively participate in the review process by taking the time to review this important document when it becomes available.

Achieve is expected to make the draft standards document available online, along with a survey/questionnaire to solicit feedback about the document. The document will be online for a set amount of time, most likely a few weeks, at [www.nextgenscience.org](http://www.nextgenscience.org). NSTA will use its communications vehicles—including *NSTA Express* and its web site—to announce when the document is available and the closing date for feedback.

NSTA suggests educators form study groups with colleagues to have focused discussions about the document. A study group is an excellent means to become familiar with the NGSS in preparation for implementation decisions and plans when the final document is released. In-depth discussions among peers will also prove valuable in providing informed feedback to Achieve. Whether you engage a small group of teachers from your school or reach out and plan a larger group review, a healthy dialogue among peers will prove valuable and informative.

NSTA has developed the following materials to help you plan and facilitate a group review:

- Agendas: Two sample agendas provide guidance for facilitating a half-day meeting (3-4 hours) or a full-day meeting (~6 hours). Feel free to adjust the times that work for your meeting and schedule.
- Facilitator Guide: An effective facilitator will be important to keep your meeting running smoothly and effectively. We've provided guidance for moving through the agenda, allowing time for small team work, group reporting, and general feedback and discussion.

- Suggested Questions: NSTA offers a list of suggested questions developed independently from Achieve. The questions are intended to stimulate an in-depth study of the document around issues NSTA considers important. These questions will not necessarily be the same ones asked on the survey/questionnaire from Achieve.
- Check List: This handy check list will ensure you've attended to every detail that will help you successfully plan and facilitate an effective group meeting.

### Planning the Meeting

Your first step is to decide the scope of your study group, which will determine the optimal number of participants. You may choose to take a broad comprehensive look at the whole NGSS document or focus on a smaller number of core ideas or specific grade levels.

It is desirable to have at least two people working as a team to review standards within a core idea. They could be grouped by grade level. If, for example, you held your meeting with middle school colleagues, you might have two people explore the life science, two the physical science, two the Earth and space science, and perhaps everyone spend time on the engineering. This allows participants the opportunity to focus their time looking closely at one area. At the elementary level, two people could focus on each grade level, or two individuals could explore adjacent grade levels.

If you are able to organize a larger group, you could create several teams to study multiple sections of the draft standards. To take a comprehensive look you would need two people each to study the elementary life, physical science, earth and space science, and all the engineering. This would be repeated for middle and high school, for a minimum of eighteen reviewers.

Assign participants to focus on specific standards based on their area of expertise or current teaching assignment. If science supervisors attend, you could assign them to areas where you lack the proper number of participants. Regardless of the size of the team, the emphasis should be on depth rather than breadth. It is much more important to have an in-depth exploration of a few sections of the document, rather than a limited look at many sections.

Next you will need to decide how long you and your participants can devote to the study group meeting. We've provided two sample agendas, one for a full day and another for a half day.

Once you've decided on the scope and meeting length, you need a location. It will be important to provide participants with wifi access so they have the opportunity to view the draft standards document online during the meeting. You will also need space and tables for participants to work in teams. Next, invite and prepare your participants.

### Getting Familiar with the Framework

You should ask participants to be familiar with the standards document prior to your meeting. As we noted earlier, the document will be available online. It is important that participants be familiar with the actual standards, as well as any background information and/or upfront matter provided by Achieve that explains the architecture and approach.

It's also important to first have a thorough understanding of the foundation for the new standards. The NGSS is based on *A Framework for K-12 Science Education*, released by the National Research Council and available online at [www.nap.edu](http://www.nap.edu). The framework describes the major practices, crosscutting concepts, and disciplinary core ideas that all students should be familiar with by the end of high school, and how these practices, concepts, and ideas should be developed across the grade levels. NSTA Press is also selling the document at [www.nsta.org/sciencestore](http://www.nsta.org/sciencestore).

NSTA has produced a number of resources to help science educators better understand the framework and its dimensions, including *The NSTA Reader's Guide to a Framework for K-12 Science Education* and a number of articles published in NSTA member journals. These resources are available at [www.nsta.org/ngss](http://www.nsta.org/ngss). NSTA Press also has assembled the Guide and the journal articles into one useful publication, *The NSTA Reader's Guide to A Framework for K-12 Science Education, Expanded Edition* (item #PB326X), available from the NSTA Science Store ([www.nsta.org/sciencestore](http://www.nsta.org/sciencestore)).

### Facilitating the Meeting

NSTA has developed a list of suggested questions to focus the group discussion. A full-day meeting will allow time to be spent on all of the suggested questions, and a half-day meeting will focus participants on a few of them. Participants should have a copy of the questions, either in hard copy or electronic form, as well as access to the standards draft document.

The handy Facilitator Guide will lead you, or someone you designate, through your agenda (full-day or half-day) and ensure you allocate appropriate time for each set of questions.

Encourage participants to bring laptops to record notes and key points from their team discussions. The notes can be shared electronically with the facilitator and/or other group members. The facilitator can use them to summarize the group's feedback and input it onto the Achieve survey/questionnaire. It would be helpful to share the group report with participants.

### Providing Feedback to Achieve

NSTA encourages teachers to form study groups because it is an excellent means of becoming familiar with the NGSS in preparation for implementation decisions and plans when the final document is released. It will also be valuable in providing informed feedback to Achieve via the online survey/questionnaire.

According to Achieve, both individuals and groups will be able to submit feedback on the online survey/questionnaire that will be posted along with the draft standards document. Study Group facilitators can collect the group's opinions and discussions, summarize them, and use them to respond to the Achieve survey/questionnaire. Participants can also submit individual feedback on the Achieve survey. It's important to know that the survey will most likely be tied to an email address and individuals will only be able to respond to the survey once. If you're inputting feedback for your study group and you want to submit your own personal feedback, you will need to use another email address.

*Note to Reader: We have not seen the Achieve survey/questionnaire when this draft guide was developed. We will update this document as needed when the first draft of the NGSS is released. Please look for a final version of this guide at [www.nsta.org/ngss](http://www.nsta.org/ngss).*

# Check List

- ✓ Determine scope of study group and select agenda
- ✓ Establish time and location
  - Do you have wifi access?
- ✓ Invite participants
- ✓ Prepare participants
  - Be familiar with draft standards
  - Send background reading/resources, agenda, and questions
- ✓ Assign individuals to teams and assign teams to specific standards
- ✓ Facilitate meeting
- ✓ Collect group feedback and fill out Achieve survey/questionnaire or encourage members to provide individual feedback

# Half-Day Sample Agenda

*Leading a Study Group*  
*Next Generation Science Standards, First Public Draft*  
(Length: ~3 hours, 45 min)

Introduction and Review of Day and Task (45 minutes)

Section I: (60 minutes)

- Clarity and Specificity
- Integrated Performance Expectations
- Coherence of Performance Expectation
- Achievability and Preparedness
- Instructional Implications of the Performance Expectations

Section II or III: (45 minutes)

- Teams select either Scientific and Engineering Practices or Crosscutting Concepts

Section IV: (45 minutes)

- Engineering Design

Wrap Up (30 minutes)

# Half-Day Facilitator Guide

## **Introduction and Review of Day and Task: (45 minutes)**

All participants should be somewhat familiar with NGSS before attending the meeting. However, you may want to allow time to review the architecture, especially if you sense that participants need to be brought up to speed. This is a good time to discuss the process, the agenda for the day, and answer questions. It is also important to emphasize the importance of depth vs. breadth. We feel it's important to make an in-depth review of a few sections of the document, rather than a limited review of many sections. The half day meeting focuses on questions in section I, section II or III, and section IV.

## **Section I: (60 minutes) Clarity, Coherence, Integration, etc.**

If you are attempting to take a broad comprehensive look at the whole document and have a large team assembled, ask participants—working individually or in teams of two—to select one core idea (life, physical or earth/space) and one of the following grade spans (K-2, 3-5, 6-8, 9-12). It is not expected that the teams will be able to get through a large number of standards. Again, the focus should be *depth* rather than *breadth*. Eight people or teams would cover the three core ideas K-12. Of course, if you are focusing your review on a particular grade level or core idea, divide your groups accordingly. Try to make sure participants are in an area of expertise and experience so they are giving valid feedback

Have participants—individuals or teams of two—record their responses to be provided to the facilitator at the end of the meeting. Please ask them to note on their responses the specific core idea and grade spans they are addressing. It's helpful to make a notation of the code at the top of each standard.

Please stop at the end of this section to discuss and compare responses as a group across the various grade levels if you have multiple grade level participants. Otherwise, discuss the grade level reviewed. The facilitator or someone the facilitator designates should take notes and/or collect team notes electronically so there is a summary of the ideas and issues discussed. It's important to note any common threads or issues.

## **Section II or III: (45 minutes) Scientific and Engineering Practices/Crosscutting Concepts**

These two sections focus on taking a horizontal look at the scientific and engineering practices and the crosscutting concepts across a grade span. Each individual or team of two should select one grade span and review the total set of practices *or* crosscutting concepts in the performance expectations to determine if all of them have been covered with enough frequency to master the practice or understand the concept. Be sure to allow time at the end for the group to discuss and compare responses, and for you to take notes and summarize.

**Section IV: (45 minutes) Engineering Design**

Ask participants—working individually or in teams of two—to select a grade span and explore the first Engineering standard following the same procedure as above. Be sure to allow time at the end for the group to discuss and compare responses, and for you to take notes and summarize. The elementary team can use this time to continue their work on the previous sections.

**Wrap Up (30 minutes)**

We recommend you allow at least a half hour at the end of the day for any general comments and new thoughts. Have the participants send their team notes to you, or someone you designate, if you are planning to provide a group response to the Achieve survey/questionnaire. Participants can also submit individual feedback on the survey. In any case, keeping good notes about each standard will be important. There will be another public release some time over the summer or fall. You could ask your group if they might like to review them again at that time.

# Full-Day Sample Agenda

*Leading a Study Group*  
*Next Generation Science Standards, First Public Draft*  
(Length: ~5.5–6 hours)

Introduction and Review of Day and Task (45 minutes)

Section I: (90 minutes)

- Clarity and Specificity
- Integrated Performance Expectations
- Coherence of Performance Expectation
- Achievability and Preparedness
- Instructional Implications of the Performance Expectations

Section II: (45 minutes)

- Scientific and Engineering Practices

Lunch

Section III: (45 minutes)

- Crosscutting Concepts

Section IV: (60 minutes)

- Engineering Design

Section V: (20 minutes)

- Nature of Science

Wrap Up (30 minutes)



# Full-Day Facilitator Guide

## **Introduction and Review of Day and Task: (45 minutes)**

All participants should be somewhat familiar with NGSS before attending the meeting. However, you may want to allow time to review the architecture, especially if you sense that participants need to be brought up to speed. This is a good time to discuss the process, the agenda for the day, and answer questions. It is also important to emphasize the importance of depth vs. breadth. We feel it's important to make an in-depth review of a few sections of the document, rather than a limited review of many sections. The half day meeting focuses on questions in section I, section II or III, and section IV.

## **Section I: (90 minutes) Clarity, Coherence, Integration, etc.**

If you are attempting to take a broad comprehensive look at the whole document and have a large team assembled, ask participants--working individually or in teams of two--to select one core idea (life, physical or earth/space) and one of the following grade spans (K-2, 3-5, 6-8, 9-12). It is not expected that the teams will be able to get through a large number of standards. Again, the focus should be *depth* rather than *breadth*. Eight people or teams would cover the three core ideas K-12. Of course, if you are focusing your review on a particular grade level or core idea, divide your groups accordingly.

Have participants—individuals or teams of two—record their responses to be provided to the facilitator at the end of the meeting. Please ask them to note on their responses the specific core idea and grade spans they are addressing. It's helpful to make a notation of the code at the top of each standard.

Please stop at the end of this section to discuss and compare responses as a group across the various grade levels if you have multiple grade level participants. Otherwise, discuss the grade level reviewed. The facilitator or someone the facilitator designates should take notes and/or collect team notes electronically so there is a summary of the ideas and issues discussed.

## **Section II: (45 minutes) Scientific and Engineering Practices**

This section focuses on the horizontal review of the scientific and engineering practices across a grade span. Each individual or team of two should select one grade span and look at the total set of practices in the performance expectations to determine if all of them have been covered with enough frequency to master the practice. Be sure to allow time at the end for the group to discuss and compare responses, and for you to take notes and summarize.

**Section III: (45 minutes) Crosscutting Concepts**

This section takes a horizontal look at the crosscutting concepts across a grade span. Each individual or team of two should select one grade span and review the total set of crosscutting concepts in the performance expectations to determine if all of them have been covered with enough frequency to master the understanding of the crosscutting concept. Be sure to allow time at the end for the group to discuss and compare responses, and for you to take notes and summarize.

**Section IV: (60 minutes) Engineering Design**

Ask participants—working individually or in teams of two—to select a grade span and review the first Engineering standard following the same procedure as above. Be sure to allow time at the end for the group to discuss and compare responses, and for you to take notes and summarize. The elementary team can use this time to continue their work on the previous sections.

**Section V: (20 minutes) Nature of Science**

This section addresses the nature of science and should only require a few minutes of discussion. Please allow time for the group to share and for you to record feedback.

**Wrap Up (30 minutes)**

We recommend you allow at least a half hour at the end of the day for any general comments and new thoughts. Have the participants send their team notes to you, or someone you designate, if you are providing a group response to the Achieve survey/questionnaire. Participants can also submit individual feedback. In any case, keeping good notes about each standard will be important. There will be another public release some time over the summer or fall. You could ask your group if they might like to review them again at that time.

With time for a sack or catered lunch and a few extra minutes for miscellaneous business, this review session is five and a half to six hours in length. Please make adjustments as needed.

# NSTA Suggested Study Group Questions

## *Next Generation Science Standards First Public Draft*

*The questions in Section I require participants to focus on one standard. Please specify the standard you are reviewing. (For example: K.OTE Organisms and Their Environment, 3.WCI Weather, Climate and Impacts, or MS.LS-SFIP Structure, Function, and Information Processing)*

### **Section I.**

#### **A. Clarity and Specificity**

- Do you have clear idea of what students must know and be able to do?
- How open to interpretation is the standard?
- Is it clear what is and is not included?

To answer these questions, think about whether the above elements in the standard are clear and specific enough for a classroom teacher to understand the outcome expected and assess whether a student has met the outcomes specified in the standard. Base your answer on all of the information in the standard, including the, stem, performance expectations, and foundation boxes.

#### **B. Integrated Performance Expectations**

- In what ways can the inclusion of all three components in a single expectation lead to improved learning of the core idea? Be as specific as you can.
- Is there a clear connection between the performance expectations and the practices, core ideas, and crosscutting concepts in the foundation box?
- Is it reasonable to assume that a student who has successfully completed the performance expectations has achieved mastery of the core ideas? practices? crosscutting concepts?
- Do you have other (new) ideas about how to integrate the three dimensions in the standards?

Each performance expectation contains a scientific or engineering practice, a core idea, and a crosscutting concept with the expectation that successful completion of a given performance expectation indicates that a student has achieved the practices, core ideas and crosscutting concepts that it is based on.

### **C. Coherence of Performance Expectations**

- Are the performance expectations within the standard conceptually coherent?
- Do they all define a cohesive and related set of ideas or outcomes?
- Are any of the performance expectations out of place?

To answer these questions, consider whether all of the performance expectation outcomes would make sense in the same instructional unit. Use examples from the standard to clarify your response.

### **D. Achievability and Preparedness**

- Would students who achieve the task described in the performance expectations be prepared for success at college and/or in their careers?
- Are the tasks described in the performance expectations reasonable expectations for all students?
- How much instructional time (days) will be required to meet the complete standard?

To answer these questions, think about what students need to know and be able to do to be successful in life and also consider the time and effort needed to help all students achieve the stated expectations.

### **E. Instructional Implications of the Performance Expectations**

- Do the performance expectations seem to prescribe specific instructional sequences and instructional strategies? Why or why not?
- Do you think that performance expectations should prescribe specific instructional sequences and instructional strategies? Why or why not?

The intent of the performance expectations is to describe what students should be able to do at the end of instruction. They are not meant to specify what students should do as part of instruction. However, some readers have interpreted them that way,

*For Sections II and III, you will need to use the standards from all core ideas in one grade span.*

## **Section II.**

### **A. Scientific and Engineering Practices**

- Are the practices described in the foundation boxes appropriate for students in this grade span?
- Are the practices represented with enough frequency in the grade span so that students will have the opportunity to master the practice by the end of that grade span?

## Section III.

### A. Crosscutting Concepts

- Are the crosscutting concepts described in the foundation boxes appropriate for students in this grade span?
- Are the crosscutting concepts represented with enough frequency so that students will understand them as “crosscutting” all the discipline within science, and not relevant to just some areas of science (Life Science, Earth Science, Physical Science, Engineering and Technology)?
- Will students recognize and see the pervasive and useful nature of the concept as a result of their inclusion in the instruction?

### B. New Crosscutting Concepts

*For the following questions, you will need to select a standard in Life Science, Earth and Space Science, or Physical Science that included one of the new crosscutting concepts listed below dealing with science, technology and society.*

- Does “Interdependence of Science, Engineering, and Technology” seem appropriate as a crosscutting concept? Why or why not?
- Does “Influence of Science, Engineering, and Technology on Society and the Natural World” seem appropriate as a crosscutting concept? Why or why not?

Note: There are also standards in Middle School and High School titled “Links among Engineering, Technology, Science, and Society that you may wish to examine.

## Section IV.

### A. Engineering Design

*The following questions are specific to the following two standards: MS-ETS-ED Engineering Design and HS-ETS-ED Engineering Design.*

- Is it clear how the performance expectations are a combination the practices, core ideas, and crosscutting concepts?
- Is there redundancy between the practices, core ideas, and performance expectations?
- If there is redundancy, does it create confusion in what the expectations are for student outcomes? Does it create confusion in what teachers should do with instruction?

Practices in general describe activities that students should be able to do while the core ideas describe things that students should understand. Note that the engineering *practices* used in the performance expectations deal with engineering design. The core ideas in the first standard also deal with engineering design. Read the performance expectations for the first engineering design standard.

## Section V.

### A. Nature of Science

*The following question is based on a previous recommendation from NSTA based on content of the framework.*

- There is no standard for the nature of science. Should there be one?
- Is the ability to carry out the practices sufficient evidence that students have an understanding of the nature of science?
- Would it make sense to have one or more crosscutting concepts dealing with the nature of science?
- Are there other ways to make the nature of science more explicit in these standards?

In the NRC Framework, the first core idea in the Engineering, Technology, and Applications of Science calls for understanding the nature of engineering design, which is the basis for the engineering practices in the first dimension. NSTA has recommended that a parallel set of standards be included for understanding scientific practices – often labeled the Nature of Science.